



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/877,366	06/08/2001	Sam Kao	M-9925 US	1516

7590 07/02/2004

MacPherson Kwok Chen & Heid, LLP  
1762 Technology Drive  
Suite226  
San Jose, CA 95110

EXAMINER

KACKAR, RAM N

ART UNIT PAPER NUMBER

1763

DATE MAILED: 07/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.



UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS  
UNITED STATES PATENT AND TRADEMARK OFFICE  
P.O. Box 1450  
ALEXANDRIA, VA 22313-1450  
www.uspto.gov

**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 09/877,366  
Filing Date: June 08, 2001  
Appellant(s): KAO, SAM

\_\_\_\_\_  
Michael Shenker

For Appellant

**EXAMINER'S ANSWER**

**MAILED**  
JUL 01 2004  
**GROUP 1700**

This is in response to the appeal brief filed 6/2/2004.

Art Unit: 1763

**(1) *Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

**(2) *Related Appeals and Interferences***

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

**(3) *Status of Claims***

The statement of the status of the claims contained in the brief is correct.

**(4) *Status of Amendments After Final***

The amendment after final rejection filed on 6/2/2004 has been entered.

**(5) *Summary of Invention***

The summary of invention contained in the brief is essentially correct.

**(6) *Issues***

The appellant's statement of the issues in the brief is substantially correct. The changes are as follows:

Since claim 7 depended upon objected claim 6, claim 7 would be allowable along with 6 if written in independent form. Therefore claim 7 should be removed from the list of issues.

**(7) *Grouping of Claims***

Appellant's brief includes a statement that claims 1-5, 7-12 and 18-30 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

**(8) Claims Appealed**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(9) Prior Art of Record**

<b><i>JP 57045233</i></b>	<b><i>Kunio et al</i></b>	<b><i>03-1982</i></b>
<b><i>US6139678</i></b>	<b><i>Oleg Siniaguine</i></b>	<b><i>10-2000</i></b>
<b><i>US 6467297</i></b>	<b><i>Bollinger et al</i></b>	<b><i>10-2002</i></b>

**(10) Grounds of Rejection**

The following ground(s) of rejection pertaining to prior art are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

1 The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2 Claims 1-5, 8-12, 18-23 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito Kunio et al (JP 57045233) in view of Oleg Siniaguine (US 6139678).

Ito Kunio discloses (Fig 1, 2, 5 and Abstract) a plurality of vortex chucks in an article holder to enable substrates held in non-contact manner and discloses similar vortex chucks

Art Unit: 1763

mounted uniformly. The article holder is disclosed configurable to rotate symmetrically with respect to an axis passing through the center of the article holder.

Ito Kunio does not disclose vortices with variable inlet cross-section area and variable distribution of vortices on the article holder.

Oleg Siniaguine discloses an article holder with non-contact type wafer holders mounted to an angle drive (Col 3 lines 47-50). The angle drive has article holders mounted asymmetrically. The wafers could be mounted using vacuum, electrostatic or mechanical means.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to mount the wafers in the apparatus of Oleg Siniaguine in a non-contact way to reduce contamination.

Regarding claims 1, 2, 4, 8, 10, 12, 21 and 28, since the article holders on the apparatus of Oleg Siniaguine in comparison to Ito Kunio are not placed symmetrically (The center of rotation is offset and away from the center of article holder-Fig 1-140X) with respect to the axis of rotation, in order to implement this teaching to the apparatus of Oleg Siniaguine, one of ordinary skill in the art would have to optimize the geometry in order to resolve the issues related to holding of the substrate due to unequal centrifugal forces and cooling effect due to larger linear velocity at the areas which are farther from the axis of rotation.

3        Claim 18 and 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bollinger et al (US 6467297) in view of Oleg Siniaguine (US 6139678).

Art Unit: 1763

Bollinger et al disclose an article holder using vortex chucks to hold substrates (Abstract) and disclose cooling due to the gas coming out of the vortex chamber. Bollinger et al disclose active cooling using temperature control of the vortex gas (Col 3 line 3-4 and lines 43-49).

Bollinger et al do not disclose mounting the article holder to a drive for moving the substrates in to position for processing.

Oleg Siniaguine discloses an article holder with non-contact wafer holders mounted to an angle drive (Col 3 lines 47-50) and discloses that different parts of the article holder have different linear velocity (Abstract)

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to implement the article holder of Bollinger et al to a drive mechanism like that of Oleg Siniaguine in order to be able to expose substrates to a processing environment and cool the substrates as per the teaching of Bollinger et al.

Regarding claims 24 and 27 cooling or adjusting the pressure of the vortex gas is an intended use.

***Allowable Subject Matter***

Claims 6 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 6 is allowable since the prior art does not disclose non-tangential gas inlet on the vortices.

Art Unit: 1763

**(11) Response to Argument**

Before answering appellant's arguments, the examiner would like to briefly state the essential elements of the claimed invention and the disclosure of the prior art according to references cited in this application.

1 Vortex chambers hold a substrate by a negative pressure created by the action of a jet of swirling fluid tangentially along the perimeter of the chamber. The cushion created between the substrate and vortex chambers by the fluid allows the substrates to be held close to the vortex chambers without actually being in contact.

2 Vortex fluid not only hold the substrate but also cool the substrate.

3 Article holders rotate with respect to an axis of rotation outside the article holder.

4 Some vortex chambers contain non-tangential holes in addition to tangential holes to modify pressure and its distribution along the surface of the article holder.

5 Article holders using plurality of vortex chambers with varying size and/or number of inlet holes distributed generally non-uniformly on the article holder.

Ito Kunio discloses vortex chamber of element 1. Bollinger et al discloses both vortex chamber to hold and the fluid to cool the substrate (element 2). Asymmetrical rotation of article holders (element 3) is disclosed by Oleg Siniaguine.

Element 4 which forms the subject matter of claim 6 and 7 is not disclosed in the prior art and has been indicated allowable.

Appellant's arguments mostly relate to the last element.

Art Unit: 1763

Regarding claims 1-5, 8-12, 21-23 and 28-30 appellant argues that all elements of these claims are not disclosed in the prior art since non-uniform geometry is not disclosed.

Examiner's position in this respect is that having different geometry for some vortex chambers including larger cross section area and greater number of gas inlets to allow greater flow closer to the rotation axis would be obvious for the following reason.

It has been explained earlier that a person of ordinary skill in the art at the time of invention would have motivation to install article holders with vortex chucks for the advantage of contamination reduction and temperature control. However, in order to implement the teachings of Ito Kunio and Bollinger et al to the apparatus of Oleg Siniaguine, one would have to optimize the geometry in order to resolve the issues related to holding of the substrate due to unequal centrifugal forces and cooling effect due to larger linear velocity at the areas which are farther from the axis of rotation. Since the area of cross section, number of outlets, gas flow and inlet pressure are interrelated and affect the performance as related to non-contact holding and heat transfer, it would have been necessary for one of ordinary skill in the art at the time of invention to find optimum values for these parameters. As discussed further, Bollinger et al suggest the cause of temperature non-uniformity. Compensating by varying amount of cooling where needed would have been obvious and straightforward.

Bollinger et al disclose cooling action of the vortex gas and discloses that air-cooling is enhanced by the holder's motion (Col 2 lines 19-20). This suggests that at the area where the linear velocity is higher (Oleg Siniaguine (US 6139678) discloses that the



Art Unit: 1763

linear velocity is higher farther from the axis) greater cooling would result, further suggesting that areas closer to axis would need to be cooled more by increasing flow or making gas colder. Bollinger discloses that direct cooling by cooling fluid temperature feed back and using higher conductive gas can help cooling (Col 3 lines 43-46).

Claim 18 recites the limitation of greater cooling for some portion of the article holder than a different portion. Appellant argues that this is not an intended use. Since this independent claim does not recite any structure this claim cannot be patentable as an apparatus claim.

Similarly claims 24 and 27 which recite that the gas at some vortex is higher in pressure or cooler than at other vortex are intended use claims.

In conclusion, it is clear that at the time of invention, one of ordinary skill in the art would have been apprised of the problem of implementing the teaching of Ito Kunio or Bollinger et al to that of Oleg Siniaguine, especially relating to cooling non-uniformity. The solution of increasing the cooling by larger outlets or more of them, or increasing the flow or pressure of cooling gas at certain areas which would normally be hotter, in order to get uniform cooling, would have been straightforward.

For the above reasons, it is believed that the rejections should be sustained.

Art Unit: 1763

Respectfully submitted,

RK

June 30, 2004

Conferees

Glenn Caldarola (SPE)

Parviz Hassanzadeh (Acting SPE)



P. Hassanzadeh 6-30-04